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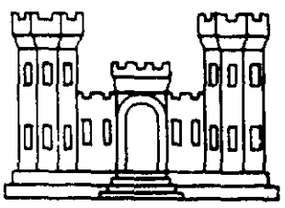
H.D. Doc. 244- 80th Cong 1st Session 3 Vols 50

SURVEY (REVIEW OF REPORTS) OF

BOSTON HARBOR

MASSACHUSETTS



AUTHORITY - THIS REPORT IS SUBMITTED IN COMPLIANCE WITH RESOLUTION, ADOPTED 5 SEPT. 1944 BY THE COMMITTEE ON RIVERS AND HARBORS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES.

U. S. ENGINEER OFFICE
BOSTON, MASS.
12 APRIL 1946

SUBJECT: Survey (Review of Reports) of Boston Harbor, Mass.

NEDGW (12 Apr 46) 1st Ind. CAT/bl

Division Engineer, New England Division, Boston 10, Mass., 16 Apr 1946

TO: Chief of Engineers, U. S. Army, Washington 25, D. C.
ATTENTION: SPEWR

1. The existing project for Boston Harbor includes an anchorage area 2,000 feet wide, 5,500 feet long and 40 feet deep on the north side of President Roads which is known as the President Roads anchorage.

2. Local interests request modification of the existing project to increase the President Roads anchorage to approximately double its present size by dredging an area mainly in a northerly direction to a depth of 40 feet at mean low water, and dredge an area on the west end adjacent to the 35-foot channel and south of a westerly line through Buoy No. 4 to a depth of 35 feet at mean low water.

3. The District Engineer recommends a modification of the existing project for Boston Harbor, Massachusetts, to provide for an extension to the President Roads anchorage by dredging 700 feet to the north and 500 feet to the west to a depth of 40 feet at mean low water, and the dredging of an area lying west of the anchorage, adjacent to the 35-foot channel, and south of a westerly line through Buoy No. 4, to a depth of 35 feet at mean low water. This increase in area is considered adequate to meet the requirements of navigation at this time, and as the benefits are of such a general nature no local cooperation in the cost should be required.

4. I concur in the recommendation of the District Engineer.

D. L. McART
Major General, U.S.A.
Division Engineer

1 Incl. - n/c

SURVEY (REVIEW OF REPORTS) OF
BOSTON HARBOR, MASS.

Syllabus

The district engineer is of the opinion that the existing project for Boston Harbor, Massachusetts should be modified in the interest of general navigation to provide for the expansion of President Roads Anchorage, and recommends an extension of the anchorage 700 feet to the north and 500 feet to the west at a depth of 40 feet at mean low water, and the dredging of an area to 35 feet below mean low water lying west of the anchorage adjacent to the 35-foot channel and south of a westerly line through Buoy No. 4, substantially as shown on the accompanying map, at an estimated cost of $1,802,000 for new work and $2,000 for annual maintenance, in addition to that now required. In view of the fact that the improvement will benefit general navigation, no local cooperation is recommended.

War Department
United States Engineer Office
Boston 16, Massachusetts
12 April 1946

Subject: Survey (Review of Reports) of Boston Harbor, Mass.

To: The Chief of Engineers, U. S. Army, Washington, D. C., through the Division Engineer, New England Division, Boston, Mass.

1. Authority.- This report is submitted in compliance with the following resolution, adopted 5 September 1944, by the Committee on Rivers and Harbors, House of Representatives, United States Congress:

> RESOLVED BY THE COMMITTEE ON RIVERS AND HARBORS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, That the Board of Engineers for Rivers and Harbors created under Section 3 of the River and Harbor Act approved June 13, 1902, be and is hereby requested to review the reports on Boston Harbor, Massachusetts, submitted in House Document Numbered 244, Seventy-second Congress, first session, with a view to determining if the existing project should be modified at the present time to provide for expansion of the existing President Roads anchorage area.

2. The preliminary examination report (review of reports) requested by the above resolution was submitted by the district engineer 15 January

1945. The report, which was favorable, was concurred in by the division engineer and the Board of Engineers for Rivers and Harbors. The survey recommended therein was authorized by letter of the Chief of Engineers dated 15 February 1945, CE SPEWR.

3. Reports under review.- The reports being reviewed under the above directive are the preliminary examination and survey reports on Boston Harbor, authorized by the River and Harbor Act of 3 July 1930. In his report dated 6 February 1932, the Chief of Engineers recommended the deepening of the main ship channel from President Roads to Commonwealth Pier No. 1 to 40 feet for a width of 600 feet, with suitable widening at the bend in the channel, and dredging to a depth of 40 feet at mean low water an anchorage 2,000 feet wide and 5,500 feet long, on the north side of President Roads, at a total cost of $4,800,000 with $30,000 annually for maintenance, subject to certain conditions of local cooperation. The project as recommended was authorized by the River and Harbor Act of 30 August 1935 and completed in 1941. Prior to inclusion in the River and Harbor Act of 1935, the 40-foot Anchorage Area was authorized by the Public Works Administration 6 September 1933.

4. Description.- Boston Harbor, which is located on the westerly side of Massachusetts Bay, is a well protected harbor, the inner portion of which has been extensively developed for water transportation. It includes all the tidewater lying within a line from Point Allerton to the end of Deer Island, and covers an area of about 47 square miles, exclusive of the islands. The approach to the harbor proper is through three improved entrance channels, with mean low water depths of 27, 30, and 35 and 40 feet from the sea to President Roads. The main ship channel, extending from President Roads to the head of the harbor, provides a depth of 35 feet for a width of 1,200 feet in the 6-mile reach from President Roads to the principal terminals at Boston, and a depth of 40 feet for a width of 600 feet in the 4-1/2 mile reach from President Roads to East Boston. The mean range of tide in the inner harbor is 9.6 feet and the

extreme range is about 4 feet greater. Branch and subsidiary channels have also been provided in the harbor.

5. The principal anchorages in Boston Harbor used by large deep-draft vessels are the Bird Island 30-foot Anchorage, on the north side of the 35-foot channel southerly of East Boston, and the 40-foot anchorage lying north of President Roads and west of Deer Island. The former comprises about 125 acres and the latter about 250 acres. An explosive anchorage is located in the lower harbor, lying between Peddocks and Rainsford Islands. These anchorages have been defined and established at Boston by the Secretary of the Treasury under authority of law, and by virtue of a proclamation issued by the President 27 June 1940.

6. There are no bridges over the portion of the harbor with which this report is concerned. The improvement under consideration in this report would not result in any shoreline changes, nor would it involve any questions of land reclamation, water power, flood control, or other special subjects. The location of Boston Harbor with its channels and anchorages is shown on United States Coast and Geodetic Survey Charts Nos. 246 and 248, and on the map accompanying this report.

7. Tributary area.- The Port of Boston is the largest seaport in New England and the most important on the Atlantic seaboard north of New York. It is the principal distributing point for the commerce of Massachusetts, New Hampshire and Vermont, and affords the shortest through route between Europe and the interior of the United States and Canada. It serves one of the largest industrial areas in the country, producing machinery, and textile and leather goods, and is the gateway for the receipt of raw materials for these industries. The City of Boston, with a population of 771,000 (1940), is the shopping, commercial, industrial, and population center of New England and is its leading wholesale center, serving a population of approximately 8,000,000. In time of peace, it has direct service to all important South American and European ports and en-

joys an extensive coastwise trade. Under normal conditions, large quantities of foreign raw materials are imported, which include wool, hides and leather, sisal, hemp, coffee and sugar. The port is also the center of the largest deep-sea fishing industry in the United States. The metropolitan area, which includes 83 independent municipalities within 20 miles, has a population of approximately 2,351,000.

8. The port is served by an excellent system of connecting highways and by three main rail lines; namely, the Boston & Maine Railroad, the New York, New Haven & Hartford Railroad, and the Boston & Albany Railroad (New York Central Railroad Co., lessee). The Union Freight Railroad, a transfer and connecting line, is operated as a part of the New York, New Haven & Hartford Railroad. It has about two miles of standard track on Atlantic Avenue and Commercial Street, forming a rail connection between the Boston & Maine and New York, New Haven & Hartford railroads. Before the war 40 steamship lines offered direct service between the Port of Boston and over 125 ports in all parts of the world. Most of these discontinued operations during the war, but are now beginning to resume service. The activities in coastwise shipping, which extended to the principal ports on the Atlantic, Gulf and Pacific coasts, were likewise curtailed because of the war.

9. Prior reports.- The following tabulation gives the essential features of all reports on Boston Harbor subsequent to the report under review, described in paragraph 3 above:

Authority	Type of Report	Document	Improvement Considered	Recommendation	Action by Congress
Resolution of Comm.on R&H, House of Rep. 10 Apr. 1934.	Prelim. Exam.	Not printed. Boston file No. 1089/11-1/2 Boston.	Widening of recommended 40' channel to afford suitable approach to Navy dry dock at South Boston.	Recommended a survey.	-
Do	Survey	R&H Comm. Doc. No. 29, 74th Cong., 1st sess.	Deepening to 40' approach channel to Navy dry dock at So. Boston.	Favorable	Adopted by R&H Act 30 Aug. 1935.

Authority	Type of Report	Document	Improvement considered	Recommendation	Action by Congress
Resolution of Comm.on R&H, House of Rep. 14 Jun. 1936.	Prelim. Exam.	Not printed. Boston file No. 1147/27 Boston.	Widening and deepening Chelsea River from Meridian St. Bridge to head of commercial navigation.	Recommended a survey.	-
Do	Survey	R&H Comm. Doc. No. 24, 75th Cong., 1st sess.	Channel in Chelsea River 30' deep and 200' wide from the mouth to a point opposite Hartol Oil Co. terminal.	Favorable	Adopted by R&H Act 26 Aug. 1937.
R&H Act 26 Aug. 1937, and resolution of Comm. on R&H, House of Rep., 18 June 1937.	Prelim. Exam.	Not printed. Boston file No. 1187/18 Boston.	Channel and turning basin in Reserved Channel west of L-Street Bridge.	Recommended a survey.	-
Do	Survey	H. Doc. No. 225, 76th Cong., 1st sess.	Dredging Reserved Channel east of L-Street Bridge 30' deep and 300' wide.	Favorable	Adopted by National Defense R&H Act, 17 Oct. 1940.
Resolution of Comm.on R&H, House of Rep. 17 Nov. 1938.	Survey	H. Doc. No. 362, 76th Cong., 1st sess.	Dredging of seaplane channel and basin.	Favorable	Do
Resolution of Comm.on Commerce, U.S. Senate, 2 May 1939.	Prelim. Exam.	Not printed. Boston file No. 1142/56 Boston.	Improvement of Shirley Cut in interest of small-boat navigation.	Unfavorable	-
Resolution of Comm.on R&H, House of Rep. 10 June 1941.	Prelim. Exam.	Not printed. Boston file No. 1295/54 Boston.	Channel 400' wide and 35' deep, with turning basin, extending from 40' anchorage to property of Boston Port Development Co. in East Boston.	Unfavorable	-
Resolution of Comm.on R&H, House of Rep. 26 Aug. 1941.	Prelim. Exam.	Not printed. Boston file No. 1300/12 Boston.	Improvement of Pleasure Bay and its approach from main ship channel, in interest of Mass. Nautical School.	Unfavorable	-

Authority	Type of Report	Document	Improvement Considered	Recommendation	Action by Congress
Resolution of Comm.on R&H, House of Rep. 10 Dec. 1941.	Survey	Not printed. Boston file No. 1309/15 Boston.	Extension of 40' main ship channel, to 550' northerly of new pier proposed to be built by Comm. of Mass.	Favorable	Adopted by R&H Act 2 March 1945.
Resolution of Comm.on R&H, House of Rep. 2 April 1943.	Survey	H. Doc. No. 472, 78th Cong., 2d sess.	Abandonment of seaplane channel and basin.	Favorable	Adopted by Public Law 420, 78th Cong. 7 Sept. 1944.
Resolution of Comm.on R&H, House of Rep. 5 Sept. 1944.	Prelim. Exam.	Not printed. Boston file No. BS 800.92 (Boston Hbr.) -44.	Extension of President Roads Anchorage Area.	Favorable	-

10. Existing project.- Previous projects for the improvement of Boston Harbor and minor channels within or tributary thereto, were authorized by the River and Harbor Acts of 2 March 1867; 14 June 1880; 19 September 1890; 3 June 1896; and 25 July 1912.

11. The Act of 2 March 1867 provided for a 23-foot main ship channel from Nantasket Roads to Boston, 600 feet wide through the Narrows to President Roads, and 1,000 feet thence to Boston. The Act of 14 June 1880 authorized the dredging of Nantaskot Beach Channel to a depth of 9-1/2 feet, 100 feet wide, and the Act of 19 September 1890 provided for increasing the width to 150 feet. Other improvements authorized by the Acts of 14 June 1880 and 19 September 1890 were, respectively, the deepening of the Charles River Channel to depths ranging from 7 feet at the mouth to 2 feet at the dam, a distance of 9 miles; and the deepening of Jeffries Point Channel to 18 feet from Grand Junction Wharf to Simpson's dry docks, and 15 feet thence to opposite Jeffries Point. Under the Acts of 3 June 1896 and 25 July 1912, Chelsea River was dredged to a depth of 25 feet and a width of 150 feet from the 35-foot channel in Boston Harbor to the Chelsea Street Bridge, a distance of 7/8 mile, and the upper mile of the navigable part of the waterway to a depth of 8.4 feet over a width of 150 feet. Expenditures for the above im-

provements amounted to $1,483,002.22, of which $1,465,122.96 was for new work and $17,879.26 was for maintenance.

12. The existing project provides for a channel 40 feet deep in general, but 45 feet deep through rock, from the sea to President Roads through Broad Sound, 2 miles, 900 feet wide except at the outer end where it is widened to 1,100 feet; deepening the main ship channel from President Roads past the United States Navy drydock No. 3 at South Boston to Commonwealth Pier No. 1, East Boston, to 40 feet for a width of 600 feet with suitable widening at the bend in the channel; deepening the main ship channel to 40 feet for a varying width of 600 to 900 feet from Commonwealth Pier No. 1 to a point 550 feet northerly of the site of Mystic Piers Nos. 46 and 47, Charlestown; an anchorage area 2,000 feet wide, 5,500 feet long, and 40 feet deep on the north side of President Roads; deepening to 40 feet that part of the approach channel to the United States Navy drydock No. 3 at South Boston between the main ship channel and the United States harbor line; a channel 35 feet deep from the sea (along the same line as the 40-foot channel) through Broad Sound to the navy yard at Charlestown and the Chelsea North, Meridian Street, and Charles River Bridges, 1,500 feet wide from the sea to President Roads, 1.5 miles, and thence 1,200 feet wide for the remaining distance of 6 miles; a channel 2 miles long, 30 feet deep, and 1,200 feet wide from the sea to President Roads through Broad Sound by a less direct route than the 35- and 40-foot channels; a channel 27 feet deep and 1,000 feet wide from Nantasket Roads to President Roads, 3 miles; a channel 15 feet deep, 300 feet wide, and 550 feet long through the bar which extends from the north head of Long Island to Nixes Mate Shoal, known as "Nixes Mate" or "Nubble"Channel; a channel in Chelsea River 30 feet deep and generally 200 feet wide, from the mouth of the river, at the head of the 35-foot channel in Boston Harbor, to a point opposite the Bartol Oil Co. Terminal; improvement of Reserved Channel east of L Street Bridge by a channel 30 feet deep and 300

feet wide; the Fort Point Channel, 23 feet deep and 175 feet wide from its entrance in Boston Harbor, about four-fifths of a mile to near the Dorchester Avenue (old Federal Street) Bridge; sea walls of coursed stone and riprap protecting the most exposed headlands and islands.

13. On 30 June 1945, the existing project was substantially completed except for the extension of the 40-foot channel from its present terminus at Commonwealth Pier No. 1, East Boston to a point 550 feet northerly of the new pier proposed to be built by the Commonwealth of Massachusetts. Costs to that time amounted to $17,101,604.05, of which $15,631,884.13 was for new work and $1,469,719.92 was for maintenance. The latest (1945) approved estimate for annual cost of maintenance is $117,000.

14. The existing project was authorized by the following River and Harbor Acts:

Acts	Work Authorized	Documents
2 Mar. 1825	Preservation of islands by sea walls.	
5 Aug. 1886	Fort Point Channel.	H.Ex.Doc.No.206,48th Cong.,2d sess.,and Annual Report 1885, page 543.
	Channel 15 feet deep from Long Island to Nixes Mate Shoal (Nixes Mate or Nubble Channel).	Annual Report 1887, page 517.
13 July 1892	Channel 27 feet deep from Nantasket Roads to President Roads.	Annual Report 1893, page 766.
3 Mar. 1899	For 30-foot channel from the sea to President Roads through Broad Sound by less direct route than the 35- and 40-foot channel.	H.Doc.No.133,55th Cong.,2d sess.,Annual Report 1898, page 886.
13 June 1902	For 35-foot channel from the sea to Navy Yard at Charlestown.	H.Doc.No.119,56th Cong.2d sess.,Annual Report 1901,p. 1096.
8 Aug. 1917	Depth of 40 foot (45 feet in rock) in Broad Sound Channel.	H.Doc.No.931,63d Cong.,2d sess. (1)
30 Aug. 1935 (2)	Present project dimensions of channel from President Roads to Commonwealth Pier No. 1, East Boston, and anchorage area north side of President Roads.	H.Doc.No.244,72d Cong.,1st sess. (1)

(1) Contain latest published maps.
(2) Authorized in part by Public Works Administration, 6 September 1933.

Acts	Work Authorized	Documents
30 Aug. 1935	Present project dimensions of that part of approach channel to U. S. Navy Dry Dock No. 3, South Boston, between main ship channel and U. S. harbor line.	Rivers and Harbors Comm. Doc. No. 29, 74th Cong., 1st sess.
26 Aug. 1937	Chelsea River Channel, 30 feet deep.	Rivers and Harbors Comm. Doc. No. 24, 75th Cong., 1st sess.
17 Oct. 1940	Reserved Channel, 30 feet deep.	H. Doc. No. 225, 76th Cong., 1st sess. (1)
7 Sept. 1944	Abandons seaplane channel authorized in River and Harbor Act approved 17 Oct. 1940 (H. Doc. No. 362, 76th Cong., 1st sess.).	Public Law 420, 78th Cong.
2 Mar. 1945	Extension of 40-foot channel to 550 feet northerly of new pier proposed to be built by Commonwealth of Massachusetts.	Public Law 14, 78th Cong.

(1) Contains latest published map.

15. Local cooperation.- The River and Harbor Act of 30 August 1935 required that local interests furnish assurances satisfactory to the Secretary of War that they would provide suitable 40-foot approach channels and berths at a sufficient number of terminals for the proper utilization of the 40-foot channel when it was completed. To meet this requirement, the Commonwealth of Massachusetts has dredged approach channels to a depth of 40 feet from the Boston & Albany piers in East Boston and from Commonwealth Pier No. 5 in South Boston, to the 40-foot ship channel.

16. The River and Harbor Act of 26 August 1937 required that local interests agree to lower the existing sewer siphon in Chelsea River near the Chelsea Street Bridge when found necessary by the Secretary of War. To provide for this requirement the Commonwealth of Massachusetts has constructed a new sewer siphon at a lower elevation. The siphon has now been completed and is in operation. Dredging in this area to provide project depth will be undertaken in the near future.

17. Other improvements.- The Commonwealth of Massachusetts has spent approximately $28,000,000 on Boston Harbor improvements, which is con-

sidered exceedingly liberal in view of the expenditures made by other ports of equal importance for harbor improvements. Included in this sum is $3,169,651 for construction of the dry dock at South Boston (now the property of the U. S. Navy); $4,014,790 for Commonwealth Pier No. 5, South Boston; and $1,199,703 for Commonwealth Pier No. 1, East Boston. The balance was spent for dredging channels, anchorage areas and filling flats in Boston Harbor and waters tributary thereto.

18. Terminal and transfer facilities.- There are approximately 220 piers and wharves within the limits of the port which provide about 26 miles of berthing space for all classes of shipping and floating equipment. Terminals available for overseas traffic offer berths for over 40 large ocean vessels simultaneously and provide 2,804 linear feet of wharf space with a depth of 40 feet of water alongside; 6,274 linear feet with depths of 34 to 35 feet; 12,286 linear feet with depths of from 30 to 32 feet; 2,977 linear feet with depths ranging between 25 and 31 feet; and 3,068 linear feet having depths of less then 25 feet. The coastwise and local steamship lines are served by wharves having a total of 10,728 linear feet of berthing space with depths of 30 feet or over, most of which could be used for overseas traffic.

19. The principal facilities used in normal times for the accommodation of passengers in foreign traffic are located at Commonwealth Pier No. 5, South Boston, the Grand Junction docks (New York Central Railroad, Boston and Albany district), East Boston and the Mystic docks at Charlestown. Of these terminals, only Commonwealth Pier No. 5, South Boston, has a depth of 40 feet in the berths. During the war normal shipping was curtailed and some of the above facilities were taken over by the Navy.

20. The waterfront facilities are generally open pile and timber docks with stone bulkhead retaining walls and solid fill at the inner ends, while the transit sheds are mostly of timber frame with steel or wood covering. The sheds at Commonwealth Pier No. 5 and at the Army Base are con-

structed of steel and concrete. The principal terminals have either depressed or surface tracks inside the transit sheds or on the aprons and have direct connections with the railroads serving the port. The majority of the terminals have mechanical facilities for the efficient and rapid transfer of cargoes.

21. There are 84 piers located on the main ship channel, 50 of which are on the East Boston front, 5 on the Chelsea front, 5 on the Charlestown front, 18 on the Boston City front, and 6 on the South Boston front. These piers or wharves include the Grand Junction docks of the New York Central Railroad (Boston and Albany district) at East Boston; Commonwealth Pier No. 5 and the New York, New Haven & Hartford Railroad piers at South Boston; and the Mystic docks at Charlestown. Fourteen of the facilities are used for handling general cargo in foreign and domestic trade, 4 of which are equipped to handle grain; 7 are normally used for handling general cargo in coastwise trade; 2 for handling commerce in local traffic; 11 are used for mooring vessels; 6 for handling coal; 4 for the receipt of fresh fish; one is a railroad carfloat bridge; 3 are used for handling lumber; 28 are used for miscellaneous purposes in connection with the business of their owners or operators; and 8 are not in use.

22. On the East Boston and Chelsea fronts of Chelsea River, there are 24 terminals located between Meridian Street Bridge and the head of navigation, 9 of which are used for handling petroleum and petroleum products; 9 for mooring vessels; 2 for handling coal; one for handling sand and gravel; 2 for miscellaneous purposes; and one is not in use.

23. There are 18 facilities located on the Reserved Channel, the most important of which are the Army Base, with 3 piers and one wharf, which occupies the entire northerly side of the channel east of the L Street Bridge, and Castle Island Wharf, with 2 piers and one wharf. These two bases are at present being used by the Army but negotiations are in progress to make them available for use by private shipping. Of the other facilities, one wharf is

used for mooring vessels; 4 are used for coal terminals; 2 are wharves for bunkering vessels; one is used for coal and petroleum; one for building and repairing recreational craft; and 2 are not in use.

24. Other terminals consist of private wharves located on contiguous waters tributary to the harbor proper, the most important of which is Mystic River. This waterway has a 30-foot channel upon which are located two of the most modern plants on the Atlantic seaboard, one used as a coal handling plant and the other as a lumber terminal.

25. In order to increase the terminal facilities of the port, the Commonwealth of Massachusetts plans to acquire from the Boston & Maine Railroad that portion of its property known as Mystic Wharves lying easterly of Chelsea Street and to extend and modernize the present structure on the south side of the property known as Piers 46 and 47. To acquire this property, with such lands on the westerly side of Chelsea Street as may be necessary for the construction of accessory facilities, and to extend and modernize Piers 46 and 47, the State Legislature has, by act approved 30 October 1941 (Chapter 714) authorized the issuance and sale of bonds in an amount not to exceed $4,700,000. Foundation investigations and plans are now being made and the work is expected to go forward in the near future.

26. Improvement desired.- In order to obtain the views of interested parties concerning the improvement desired, a public hearing was held at Boston, Massachusetts on 21 November 1944. The report on preliminary examination together with transcript of hearing, exhibits presented, map and other pertinent papers, were submitted to the division engineer on 15 January 1945. Present at the hearing, which was well attended, were representatives of the Maritime Association of the Boston Chamber of Commerce, the Massachusetts Department of Public Works, the Navy Department, the Boston Port of Embarkation, the Boston Port Authority, the towboat companies, the oil companies, and others interested in the development of the Port of Boston.

27. The improvement desired by the proponents is the extension of the President Roads 40-foot Anchorage to approximately double its present size

by dredging an area mainly north of the existing anchorage, and dredging an area to 35 feet below mean low water on the west end adjacent to the 35-foot channel and south of a westerly line through Buoy No. 4. This northward extension has been recognized as desirable in that the farther behind Deer Island the anchorage extended, the more protection would be afforded vessels from east and northeast winds.

28. It was stated at the hearing that the trend is toward larger and deeper draft vessels; that the need for greater anchorage space in Boston Harbor is acute at present and will become more so in the near future; and that, unless more space is provided it will result in the loss of much of the traffic in the harbor. Although during the period 1940 through 1945 most of the commerce of the port was of a wartime nature, with the return to normalcy it is anticipated that the needs will be just as great. With the use of the new deep-draft victory ships, the enormous amount of overseas shipping during the demobilization and rehabilitation period, and the eventual resumption of regular schedules of passenger liners to European ports, an anchorage of ample size and depth to meet the needs of shipping with the least possible delay will be most essential in maintaining the Port of Boston as one of the three leading Atlantic ports. The anchorage facilities available is one of the first considerations when shipping concerns are establishing their ports of call.

29. Representatives of the Navy Department described the difficulties encountered in anchoring battleships of the NEVADA and IOWA class in President Roads Anchorage, and stated that the present anchorage is considered most inadequate. It was pointed out that a circle of 400-yard radius is required to anchor a battleship and that battleships move in squadrons of three. Consequently, more than the entire present anchorage would be required to anchor a squadron of battleships, leaving, with the proposed enlargement, much less room for commercial vessels than they now have. On the other hand, it was stated that there are three berths at the Navy Yard that will accommodate battleships, but contingencies might arise that would require the use of President Roads. In discussing the requirements for a satisfactory anchorage area, it

was brought out that vessels cannot anchor on rock bottom, and that if rock is present, it must be at least 50 feet below the surface at mean low water to provide suitable holding ground. By letter dated 20 February 1946, the Commandant, First Naval District, stated that he considers that additional anchorage area in Boston Harbor, and particularly in President Roads, is essential to the accommodation of Naval vessels in the Boston area, as all berthing areas for Naval vessels are now congested and there is no indicated lessening of congestion in the foreseeable future,

30. The Captain of the Port stated that he is primarily concerned with the control of merchant ships within the harbor, assigning anchorage space, and preventing them from anchoring in the channel or becoming a menace to other ships. Each time a big ship - merchant or battleship - comes in for anchorage, patrol boats have to move smaller boats around in order to make room for it, and they often have no place to go when ordered from the anchorage. A great deal of expense is involved in moving a vessel and a considerable saving in the cost of fuel and pilotage would be effected by providing a suitable anchorage area.

31. The Director of the Division of Waterways of the Massachusetts Department of Public Works corroborated the statements made by the other interests as to the great need for an enlarged anchorage area in Boston Harbor. He outlined briefly the many improvements that have been developed in the harbor and the business enterprises that have been located there through the efforts of the State, and reviewed previous attempts made to obtain the desired anchorage extension. He said that they would be glad to get all available suitable material to use as fill for the Boston Airport now under construction by the Commonwealth, but that all airport funds are now obligated and the contracts let, and no financial contribution could be expected from that source. It has since been learned from the Director of the Division of Waterways that all materials encountered in dredging any extension of the President Roads Anchorage could be disposed of in the airport areas, but entirely at Federal expense.

32. Commerce.- The Port of Boston is principally a port of general commerce, handling in excess of 19,000,000 tons in 1940. While there has been an upward trend in the tonnage since 1938, prior to that time it remained fairly stationary, averaging about 16,600,000 tons in the 8-year period since 1930. The leading commodities in the commerce of the port are coal and petroleum and its products. In 1940 these commodities comprised about 34 per cent and 45 per cent, respectively, of the inbound commerce and about 75 per cent of the total commerce of the port. The following table gives a comparative statement of traffic. However, the years 1942 to 1944 include only general commercial freight and do not give a true picture of the commerce of the port, due to the fact that the figures on shipments of military supplies are not available. During the years 1941 to 1944, inclusive, the duties collected in the Boston collection district averaged about $75,000,000 annually.

Comparative Statement of Traffic

Year	Tons	Passengers	Year	Tons	Passengers
1931	16,559,777	4,297,958	1938	15,881,487	7,133,809
1932	14,012,172	3,828,023	1939	17,842,212	7,196,164
1933	15,378,133	3,419,390	1940	19,018,305	2,776,176
1934	15,278,058	2,393,173	1941	+18,826,770	2,100,309
1935	16,384,958	9,720,971	1942	*10,431,179	1,151,935
1936	17,214,140	8,580,601	1943	# 8,471,046	836,791
1937	18,390,390	8,180,452	1944	#10,783,017	875,705

+In addition to the above, there were 1,452,882 tons of general cargo in transit.

*In addition to the above, there were 465,208 tons of general cargo in transit.

#In addition to the above, there was general cargo in transit, the tonnage of which is not of record.

33. Vessel traffic.- Inasmuch as the principal benefit to be derived from the desired improvement is claimed by the proponents to be its usefulness in connection with the regular commerce of the Port of Boston in normal times, the statistical information given below is that for the calendar year 1940, which is considered a more accurate index of the normal activity of the Port of Boston than the figures since that time would be,

due to the disrupting of the traffic of the port because of war conditions. The following table gives the trips and drafts of vessels using Boston Harbor in 1940.

Vessel Traffic+

Draft (feet)	Steamers#	Motor Vessels	Sailing	Barges	Naval Vessels	Miscellaneous	Total
INBOUND*							
31	115	6	--	--	--	--	121
30	1	8	--	--	--	--	9
28 to 30	331	48	--	--	1	--	380
26 to 28	369	56	--	--	2	--	427
24 to 26	259	61	--	4	3	--	327
22 to 24	214	52	--	13	5	--	284
20 to 22	233	46	--	20	5	--	304
18 to 20	1,078	65	--	50	4	--	1,197
Less than 18	1,550	1,627	14	899	372	137	4,599
Total	4,150	1,969	14	986	392	137	7,648
Total net registered tonnage	10,495,988	2,175,399	4,031	697,558	--	--	13,372,976
OUTBOUND*							
31	1	--	--	--	1	--	2
30	1	--	--	--	--	--	1
28 to 30	16	11	--	--	1	--	28
26 to 28	48	30	--	--	2	--	80
24 to 26	139	38	--	--	3	--	180
22 to 24	155	54	--	2	5	--	216
20 to 22	144	74	--	8	5	--	231
18 to 20	1,191	108	--	33	6	--	1,638
Less than 18	2,176	1,642	18	935	377	140	5,288
Total	4,171	1,957	18	978	400	140	7,664
Total net registered tonnage	10,604,220	2,183,830	5,661	706,753	--	406	13,500,870
TOTAL							
Total	8,321	3,926	32	1,964	792	277	15,312
Total net registered tonnage	21,100,208	4,359,229	9,692	1,404,311	--	406	26,873,846

+Excluding local movement inside harbor and small vessels in fishing trade. During 1940 there were 7,243 arrivals of fishing boats of 5-to 17-foot draft.

*Foreign arrivals totaled 821 steamers, 544 motor vessels, 10 sail, and 3 barges; total net registered tonnage 4,017,263. Foreign departures totaled 817 steamers, 538 motor vessels, 14 sail, and 1 barge; total net registered tonnage 4,014,521.

#Including tugs.

34. Difficulties attending navigation.- According to local interests the principal difficulty attending navigation in Boston Harbor results from a lack of anchorage space suitable for deep-draft vessels. Due to the inadequacy of the facilities, ships have frequently been forced to anchor outside the harbor limits, and large vessels have been obliged to maneuver for a considerable time seeking anchorage, often anchoring at the edge of the channel. The shoal area lying westerly of President Roads Anchorage is a serious hazard with an east wind and flood tide, and ships have occasionally gone aground or struck bottom there under those conditions, when entering or leaving the anchorage.

35. Survey.- A sounding survey was made of the entire area included in the desired improvement. Twenty-six borings were made, and samples taken of the various materials in each hole, to determine the nature of the materials and the depth to ledge rock where encountered. The accompanying map, marked "Boston Harbor, Massachusetts, in 1 sheet, File No. 1677, Dr. 1", shows the latest soundings throughout the area and the logs of the borings.

36. Plan of improvement.- There are two plans of improvement considered herein, all as shown on the accompanying map. In the estimates given below, the quantities are place measurement and provide for 2 feet allowable overdepth and 1 on 3 side slopes. The prices include an allowance for engineering and contingencies, and are based on the work being done by contract and the disposal of the dredged material by pumping it into the area on the south side of the airport as indicated on the accompanying map. Under Plan A, the material would have to be pumped to an elevation of about 15 feet above mean low water, requiring the use of shore pipe line crews in disposing of the material. This would result in higher costs for disposal than under Plan B where all the material can be disposed of with a floating pipe line. For this reason, in spite of the large quantity to

be removed under Plan A, it is estimated that the unit price for the work under either plan would be the same.

37. Plan A, the improvement desired by local interests, is the extension of President Roads Anchorage 2,000 feet to the north and 500 feet to the west at a depth of 40 feet at mean low water, and the dredging of an area to 35 feet below mean low water on the west end, adjacent to the 35-foot channel, and south of a westerly line through Buoy No. 4.

Dredging to 40 feet extension 2,000 feet north and 500 feet west of President Roads Anchorage	
10,233,000 cubic yards @ 38¢	$3,888,500
Dredging to 35 feet an area lying west of anchorage and adjacent to 35-foot channel	
888,000 cubic yards @ 38¢	337,500
Total	$4,226,000
Additional Annual Maintenance Cost	3,000

38. Plan B, the improvement recommended in this report, is such that, with the area in the present anchorage, it will provide free swinging room for two large battleships. It is the extension of President Roads Anchorage, 700 feet to the north and 500 feet to the west, at a depth of 40 feet at mean low water, and the dredging of an area to 35 feet below mean low water on the west end, adjacent to the 35-foot channel, and south of a westerly line through Buoy No. 4, to a depth of 35 feet at mean low water.

Dredging to 40 feet extension 700 feet north and 500 feet west of President Roads Anchorage	
3,854,000 cubic yards @ 38¢	$1,464,500
Dredging to 35 feet an area lying west of anchorage and adjacent to 35-foot channel	
888,000 cubic yards @ 38¢	337,500
Total	$1,802,000
Additional Annual Maintenance Cost	2,000

39. Aids to navigation.- No additional aids to navigation will be required for the improvement.

40. Analysis of economic justification.- The economic cost, as an annual carrying charge for each of the proposed plans of improvement, has been estimated on a life of 40 years. The analysis of cost is given below:

	Plan A	Plan B
(1) Federal Investment:		
(a) Estimated cost of improvement by Engineer Department	$4,226,000	$1,802,000
(b) Estimated cost of aids to navigation by U. S. Coast Guard	-0-	-0-
(c) Total Federal Investment	$4,226,000	$1,802,000
(2) Federal Annual Carrying Charge:		
(a) Interest at 3% on Item (1)(c)	$ 126,780	$ 54,060
(b) Amortization of Item (1)(a) (40 years at 3%)	56,037	23,895
(c) Increased cost of maintenance	3,000	2,000
(d) Total Federal Annual Carrying Charge	$ 185,817	$ 79,955
(3) Non-Federal Investment:	-0-	-0-
(4) Total Annual Carrying Charge:		
(a) Federal Annual Carrying Charge	$ 185,817	$ 79,955
(b) Non-Federal Annual Carrying Charge	-0-	-0-
(c) Total Annual Carrying Charge	$ 185,817	$ 79,955

41. While the tangible benefits cannot be evaluated to compare with the annual carrying charges, the expenditure for the lesser improvement is considered justifiable in view of the national importance of the port, the volume of foreign and domestic commerce, the customs collected, and the advantage to naval and commercial navigation of having an adequate anchorage available at all times.

42. Discussion.- The present anchorage, recommended by the report under review, is 2,000 by 5,500 feet, and was estimated to have a capacity of three large ships, based on a swinging radius of 900 feet. Actually, in the last few years, twenty-five to thirty cargo ships have frequently

been anchored in the area at one time while a convoy was being assembled. Such close grouping of large ships is extremely hazardous and requires constant vigilance on the part of the crews to prevent serious accidents with a change of wind or tide. Congestion to this extent is not common during normal times, but crowded conditions often exist. The anchorage is used normally for deep-draft vessels and all vessels requiring quarantine inspection. The peacetime commerce has averaged approximately 16,000,000 tons annually and the post-war shipping will, in all probability, exceed this amount and be carried in larger vessels.

43. Based upon the experience of the past years under both peacetime and war conditions, it is the opinion of the shipping and towboat interests and the Navy and Port officials that additional anchorage space for deep-draft ships is badly needed in President Roads. The Navy representatives believe that the present area should be increased to permit at least two battleships to anchor there at one time. As a criterion, they state that a battleship requires a circle of 400 yards radius for free swinging anchorage. From the commercial viewpoint, the majority of the interests advocated increasing the area to approximately double its present size by extending it 2,000 feet to the north in the lee of Deer Island and dredging an area to 35 feet below mean low water on the west end adjacent to the 35-foot channel and south of a westerly line through Buoy No. 4.

44. There is an area 300 feet wide lying between the anchorage and the 1,200-foot channel, so that an extension 700 feet to the north and 500 feet to the west of the present area would produce a total anchorage basin, 3,000 feet by 6,000 feet, which would amply meet the Navy's requirements for anchoring two battleships. It would accommodate two of the largest vessels afloat, such as the Queen Mary, or eight vessels about 500 feet in length. This extension is believed to be adequate to meet the present and future needs of deep-draft vessels and the benefits to be derived justify the annual carrying charges of this plan.

45. The dredging of the area lying west of the anchorage area and adjacent to the 35-foot channel is considered desirable by local shipping interests to prevent the grounding of vessels as they come out of President Roads with a flood tide and a strong easterly wind. This is believed to be warranted since it will improve conditions for the maneuvering of vessels entering or leaving the anchorage.

46. At the request of the Office, Chief of Engineers, a study of anchorage conditions and various methods of improvement was made early in 1942 by this office, in conjunction with the local representatives of the Navy Department and the Massachusetts Department of Public Works. Dredging President Roads Anchorage to more than twice its present size and various arrangements of mooring dolphins, with a lesser amount of dredging were considered and estimates of cost were made. Due to the excessive cost and the time necessary to accomplish the work under any one of the plans, it was concluded that the project was inadvisable at that time.

47. The disposal of the dredged material from the extension of the anchorage in the fill being made for the Boston Airport (Logan International Airport) is practicable but of little advantage to the project. The material is largely sandy silt underlain in part with blue and yellow clays and it can be dredged by a hydraulic or a dipper dredge. In pumping the material to the airport area, a booster pump would be required on account of the long pipe line (12,000 feet). For this reason the cost of dredging by a hudraulic dredge discharging in the airport area would be approximately the same as by a dipper dredge loading the material in scows and towing it to sea. The airport authorities are agreeable to having the dredged material pumped to the airport but are unable to obligate the state to contribute any part of the cost.

48. In a letter recently received from the Commissioner of Public Works of the Commonwealth of Massachusetts, it is stated that the depart-

ment would be glad to give permission to the Federal Government to place fill in the airport area provided that it is placed so as to provide the best possible fill for a runway. It is also stated that the Department of Public Works does not believe that any charge should be made by the Federal Government for such material, but if the project cannot be authorized without such a charge being paid by the Commonwealth of Massachusetts, the department would be glad to cooperate to the extent of trying to obtain funds from higher authority. In view of the general benefits ensuing from the improvement, it is not believed desirable to make the adoption of the project dependent upon such indefinite cooperation by the Commonwealth of Massachusetts.

49. In view of the above, the most economical method of disposal is by pumping the material in the area south of the airport and east of Governor's Island. A portion of this area was used as a borrow area in securing fill for the airport. In disposing of the material to be removed under Plan B, the recommended plan, the area would be filled to about sea level. Disposal of material under Plan A in this area would require filling to about elevation 15. The airport authorities have no objection to heavy material being placed in the runway area of the airport if it is convenient during the dredging operations.

50. Conclusion.- It is the opinion of the district engineer that the enlargement of President Roads Anchorage, Boston Harbor, Massachusetts, described as Plan B in paragraph 38 of this report, is adequate and necessary to meet the requirements of navigation and is justified by the intangible benefits accruing to the large volume of commerce in the port, and by its value to shipping in general.

51. Recommendation.- In view of the foregoing, the district engineer recommends that the existing project for Boston Harbor, Massachusetts, be modified to provide for the extension of President Roads Anchorage 700

feet to the north and 500 feet to the west at a depth of 40 feet at mean low water, and the dredging of an area to 35 feet below mean low water lying west of the anchorage, adjacent to the 35-foot channel, and south of a westerly line through Buoy No. 4, substantially as shown on the accompanying map, at an estimated cost of $1,802,000 for new work and $2,000 for annual maintenance, in addition to that now required. As the proposed improvement is in the interest of general navigation, no local cooperation in the cost is recommended.

52. The work should be prosecuted at a rate to insure its completion within one year, and the necessary funds should be provided in a single appropriation.

C. T. HUNT,
Colonel, Corps of Engineers,
District Engineer.

Inclosure:
Map

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

BOSTON HARBOR
MASSACHUSETTS

EAST BOSTON

SOUTH BOSTON

WINTHROP

GOVERNORS ISLAND

APPLE ID.

SNAKE ID.

PT. SHIRLEY

DEER ISLAND

SPECTACLE ID.

LONG ID.

BIRD ID. FLATS

GOVERNORS ID. FLATS

LOWER MIDDLE

CHANNEL

ANCHORAGE

RESERVED CHANNEL

PRESENT 40' ANCHORAGE

PRESIDENT ROADS

DISPOSAL AREA 7

GENERAL EDWARD LAWRENCE LOGAN AIRPORT

COMMONWEALTH PIER NO. 1

COMMONWEALTH PIER NO. 5

B. & A. R.R.

N.Y.N.H. & H.R.R.

EXISTING BULKHEAD

EXISTING PIERHEAD & BULKHEAD LINE

Filling in progress

30 & 35-FT. CHANNEL TO FUEL OIL PIER

30-FT. BIRD ID.

35-FT. CHANNEL

40-FT. CHANNEL

8' CHANNEL (dredged by Comm. of Mass)

10' CHANNEL

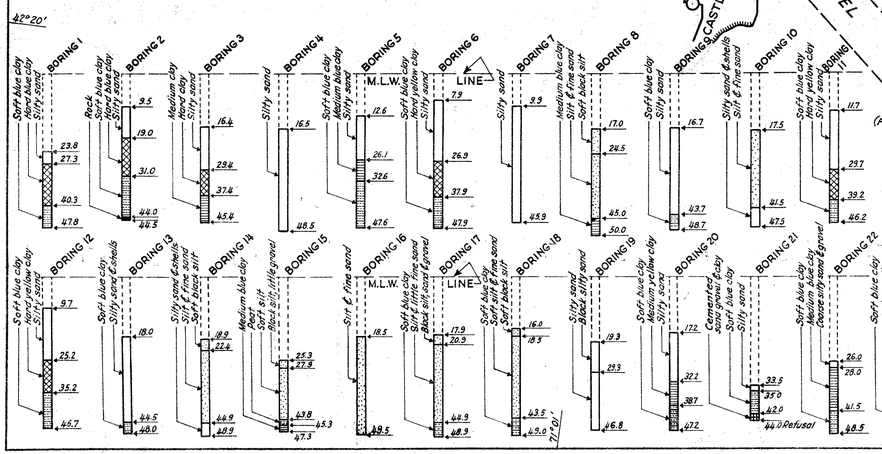
RUNWAY LAYOUT - Department of Public Works of Massachusetts, Division of Waterways, October 1944

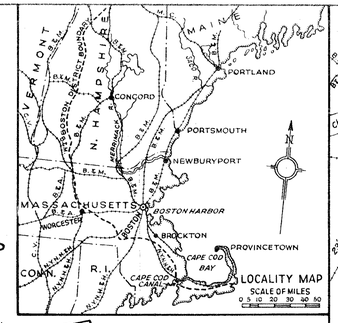
RECOMMENDED IMPROVEMENT 35' BELOW M.L.W.

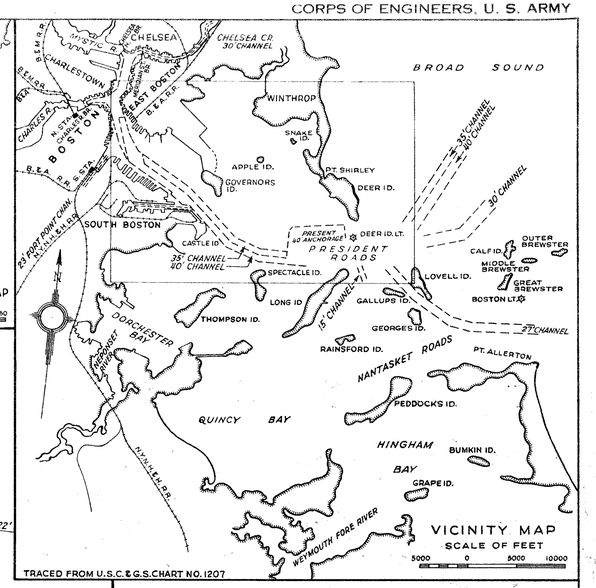
RECOMMENDED IMPROVEMENT NO BELOW M.L.W.

DESIRED IMPROVEMENT NO BELOW M.L.W.

NOTE:
BORINGS 1 TO 7 INCL. TAKEN OCT. 1944
BORINGS 8 TO 26 INCL. TAKEN MAY. 1945

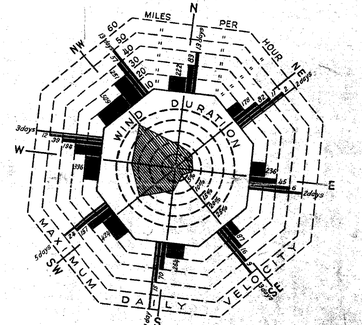






TRACED FROM U.S.C.&G.S. CHART NO. 1207

WIND DIAGRAM FOR BOSTON HARBOR, MASS.
1927 - 1937



DATA TAKEN FROM OBSERVATIONS BY THE U.S. WEATHER BUREAU STATION AT BOSTON, MASS.

LEGEND

- MEAN HIGH WATER LINE
- MEAN LOW WATER LINE
- 6-FT. CURVE OF DEPTH
- 12-FT. CURVE OF DEPTH
- 18-FT. CURVE OF DEPTH
- 24-FT. CURVE OF DEPTH
- 30-FT. CURVE OF DEPTH
- 40-FT. CURVE OF DEPTH
- BORINGS ⊙20

42°21'

NOTE: DEPTHS EXPRESSED IN FEET AND TENTHS ARE TAKEN FROM SURVEY MADE IN APRIL 1945. ALL OTHER DEPTHS AS WELL AS THE SHORE LINE AND WHARVES WERE TAKEN FROM AN ENLARGEMENT OF U.S.C.& G.S. CHART NO. 246. DEPTHS ARE REFERRED TO THE PLANE OF MEAN LOW WATER AS INDICATED BY THE BENCH MARK.

BENCH MARK: THE TOP OF THE COPING AT THE ENTRANCE TO THE OLD DRYDOCK AT THE CHARLESTOWN NAVY YARD. THE ELEVATION IS 14.69 FEET ABOVE MEAN LOW WATER.

IN 1 SHEET

SCALE 1:10000

1000 500 0 1000 2000 3000 4000 FT.

U. S. ENGINEER OFFICE, BOSTON, MASS. 28 FEB. 1946

APPROVAL RECOMMENDED John E. Allen CHIEF ENGINEERING DIVISION	APPROVED: COLONEL, CORPS OF ENGINEERS DISTRICT ENGINEER
SUBMITTED: H.N. [illegible] SR. ENGINEER	TRANSMITTED WITH SURVEY REPORT DATED 12 APR. 1946
DES. BY DR. BY CHP CH. BY J.N.H	FILE NO. 1677 DR. 1